

## Claims

1. In an electrochemical cell, a cathode comprising:  
a cathode active material including a valency change material.
2. The cathode according to claim 1, wherein said valency change material provides said cathode with a cathode fuel storage capacity via a change in the valency state of the valency change material.
3. The cathode according to claim 1, wherein said valency change material provides said cathode with an oxygen storage capacity via a change in the valency state of the valency change material.
4. The cathode according to claim 1, wherein said valency change material is a nickel hydroxide/nickel oxyhydroxide redox couple.
5. The cathode according to claim 1, wherein said valency change redox material comprises a metal/metal oxide redox couple of an element selected from the group consisting of copper, silver, zinc and cadmium.

6. The cathode according to claim 1, wherein said valency change redox material comprises a metal oxide/oxide redox couple of a metal selected from tin or manganese.

7. The cathode according to claim 1, wherein said valency change redox material comprises a cobalt hydroxide/oxyhydroxide redox couple.

8. The cathode of claim 1, further including a hydrophobic component.

9. The cathode of claim 8, wherein said hydrophobic component comprises polytetrafluoroethylene (PTFE).

10. The cathode of claim 9, wherein said PTFE is at least one of:

- a) intimately mixed with said cathode active material;
- b) graded within said cathode active material; or
- c) a separate layer within said cathode.

11. The cathode of claim 1, further including a current collector extending within said active material.

12. The cathode of claim 11 wherein said current collector

comprises an electrically conductive mesh, grid, foam or expanded metal.

13. The cathode of claim 1, further including a catalytic carbon component.

14. A cathode active material for a cathode comprising:  
a valency change material adapted to store and supply a cathode fuel via a change in valency during use of said cathode.

15. The cathode active material of claim 14, wherein said cathode fuel is oxygen.

16. The cathode active material according to claim 14, wherein said valency change redox material is a nickel hydroxide/nickel oxyhydroxide redox couple.

17. The cathode active material according to claim 14, wherein said valency change redox material comprises a metal/metal oxide redox couple of an element selected from the group consisting of copper, silver, zinc and cadmium.

18. The cathode active material according to claim 14, wherein said valency change redox material comprises a metal

oxide/oxide redox couple of a metal selected from tin or manganese.

19. The cathode active material according to claim 14, wherein said valency change redox material comprises a cobalt hydroxide/oxyhydroxide redox couple.